

matter of the invention. In view of the above amendments and the following remarks, it is respectfully submitted that all of the presently pending claims are allowable.

Claim 1 stands rejected under 35 U.S.C. § 103 as obvious over Matsui (Japanese Patent Publication No. 61-135979) in view of Marks (U.K. Patent No. 400,836). The Examiner stated, in support of the rejection, that Matsui shows the invention substantially as claimed except for the acute angle of the holes as claimed, but that Marks shows such an angle.

Claim 1 recites a fuel injection valve comprising "a fuel jet adjusting plate for atomizing fuel injected when the valve body assumes the open position" and "a plurality of first nozzle holes arranged along a first circle on said fuel jet adjusting plate, and coaxial with a central axis of the valve body" in combination with "a plurality of second nozzle holes arranged along a second circle concentric with the first circle and having a diameter larger than that of the first circle, wherein each of the second nozzle holes extends through the fuel jet adjusting plate along a respective second hole axis and wherein the second hole axes form corresponding second acute angles with a plane perpendicular to the central axis and wherein each of the first nozzle holes extends through the fuel jet adjusting plate along a respective first hole axis, the first hole axes forming a corresponding plurality of first acute angles with the plane perpendicular to the central axis and wherein the second acute angles are smaller than the first acute angles."

Initially, it is noted that, in contrast to the recitation of claim 1, the nozzle holes 12 of Matsui are arranged on a circle of larger diameter than that on which nozzle holes 13 are arranged yet the acute angle of holes 12 is larger than that of holes 13. In addition, the passages 4 of Marks are not even arranged in concentric circles. Rather, they are arranged on the inner surface of a sphere at varying distances from the axis. Furthermore, no specific distribution of passages 4 at different angles is either illustrated, described, shown or suggested by Marks. The passages 4 are simply described as "divided evenly about the axis of the nozzle piece in order to ensure a proper and even distribution of fuel." (Page 2, col. 1, lines 15 to 18). Thus, it is respectfully submitted that Marks provides absolutely no motivation: 1) to select any specific angular arrangement of holes about a circle and clearly not to select a specific relationship between the angle of each of a first set of holes on a first circle to the angle of each of a second set of holes on a second concentric circle; and 2) to reverse the angular arrangement of Matsui which is completely opposite that recited in claim 1.

It is therefore respectfully submitted that neither of the cited references provides any motivation for the specific arrangement recited in claim 1 and that this rejection should be withdrawn.

Claims 2 and 3 stand rejected under 35 U.S.C. § 103 as obvious over Matsui in view of Marks as applied to claim 1 in further view of Jensen. The Examiner stated, in support of the rejection, that Matsui in view of Marks shows

the invention substantially as claimed except for the recitation of claim 2.

For the reasons stated above in regard to claim 2 from which claim 1 depends, it is respectfully submitted that Matsui in view of Marks does not show the invention of claim 1 and that Jensen also fails to cure this defect.

Furthermore, it is respectfully submitted that Jensen also fails to show the more specific recitations of claim 2. Specifically, claim 2 recites a fuel injection valve according to claim 1 "wherein the fuel injection valve is mounted in an intake port of a cylinder to inject and atomize fuel so that the fuel reaches a combustion chamber of the cylinder at a timing at which an intake valve assumes its open position, *the intake valve opening and closing the intake port of the cylinder to selectively permit intake air to enter the cylinder* and wherein *the fuel injection valve is positioned so that fuel sprays injected through the first and second nozzle holes do not reach a central portion of a mushroom-shaped portion of the intake valve but only an outer periphery of the mushroom-shaped portion.*"

The Examiner correlated the intake poppet valve 42 having a stem 43 and a face portion 42a to the recited intake valve. However, as made clear in amended claim 2, the valve 42 of Jensen is completely unrelated to the recited intake valve. Specifically, the valve 42 of Jensen operates to open and close the fuel injector valve 40. The valve 42 of Jensen clearly does not open or close the intake port of a cylinder to selectively permit intake air to enter

the cylinder as recited in claim 2. Thus, the fuel injection valve of Jensen is also not positioned to spray fuel through first and second nozzle holes so as not to "reach a central portion of a mushroom-shaped portion of the intake valve but only an outer periphery of the mushroom-shaped portion," when the intake valve is open, as recited in claim 2.

It is therefore respectfully submitted that claim 2 is not rendered obvious by Matsui, Marks and Jensen and that this rejection should be withdrawn.

Because claim 3 depends from and, therefore, includes all of the limitations of claim 2, it is submitted that this claim is also allowable.

New claim 4 recites a fuel injection valve comprising "a fuel jet adjusting plate including an upstream surface arranged in a first plane, the fuel jet adjusting plate atomizing fuel injected when the valve body assumes the open position" and "a plurality of first nozzle holes along a first circle on the upstream surface of the fuel jet adjusting plate, and coaxial with a central axis of the valve body" in combination with "a plurality of second nozzle holes arranged along a second circle on the upstream surface of the fuel jet adjusting plate concentric with the first circle and having a diameter larger than that of the first circle, wherein each of the second nozzle holes extends through the fuel jet adjusting plate along a respective second hole axis and wherein the second hole axes form corresponding second acute angles with a plane

perpendicular to the central axis and wherein each of the first nozzle holes extends through the fuel jet adjusting plate along a respective first hole axis, the *first hole axes forming a corresponding plurality of first acute angles with the plane perpendicular to the central axis and wherein the second acute angles are smaller than the first acute angles.*"

In addition to the reasons for allowance stated above in regard to claim 1, it is submitted that Matsui shows a fuel injection valve with two sets of openings, which are not arranged on a planar surface - a first set of smaller openings 12 through which fuel is injected during low load operation and a second set of larger openings 13. During high load operation fuel is injected through both openings 12 and openings 13. The two sets of openings are separated in a direction of a longitudinal axis of the valve body so that, when the valve stem moves a first distance, only the openings 12 are exposed and, upon further movement of the valve stem all of openings 12 and 13 are exposed. Matsui includes no showing or suggestion of two concentric sets of openings arranged in the same plane. Furthermore, the whole purpose of the valve of Matsui would be frustrated by a fuel injector having "a plurality of first nozzle holes along a first circle on the upstream surface of the fuel jet adjusting plate, and coaxial with a central axis of the valve body" and "a plurality of second nozzle holes arranged along a second circle on the upstream surface of the fuel jet adjusting plate concentric with the first circle" wherein the upstream surface of the fuel jet adjusting plate is arranged in a plane, as recited in claim 4.

For these reasons and the reasons stated above in regard to claim 1, it is respectfully submitted that claim 4 and dependent claims 5 and 6 are allowable.

It is therefore respectfully submitted that all of the presently pending claims are allowable. All issues raised by the Examiner having been addressed, an early and favorable action on the merits is earnestly solicited.

Respectfully submitted,

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